

The opinion in support of the decision being entered today
was **not** written for publication in and
is **not** binding precedent of the Board.

Paper No. 15

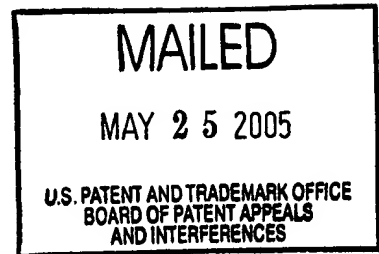
UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TROY DAVID ARMSTRONG
and MICHAEL STEVEN FAUNCE

Appeal No. 2005-0299
Application No. 09/456,211

ON BRIEF



Before GROSS, BLANKENSHIP, and NAPPI, **Administrative Patent Judges.**

NAPPI, **Administrative Patent Judge.**

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 of the final rejection of claims 1 through 29 which constitute all the claims remaining in the application. For the reasons stated *infra* we will not sustain the examiner's rejection of these claims.

THE INVENTION

The invention relates to a computer system for arbitrating, between requesters, access to a shared storage system. See page 1 of appellants' specification. Algorithms that arbitrate access based upon requesters are known in the prior art as "fair" algorithms, and algorithms which arbitrate access based upon location are known in the prior art as "elevator" algorithms. See page 2 of appellants' specification. Appellants' system combines these two algorithms and sorts access requests in two stages, in the first stage access requests are sorted by requestor and in the second stage the requests are sorted by position within the shared storage system. See page 4 of appellants' specification.

Claim 1 is representative of the invention and reproduced below:

1. A method of processing access requests for a direct access storage device (DASD), each access request associated with a requester and position on the DASD, the method comprising:
 - (a) sorting at least a subset of a plurality of access requests directed to the DASD based upon the requesters associated therewith to generate a first ordered set of access requests;
 - (b) sorting at least a subset of the access requests in the first ordered set of access requests based upon the position associated therewith to generate a second ordered set of access requests; and
 - (c) issuing each of the access requests in the second ordered set of access requests in sequence to the DASD.

THE REFERENCES

The references relied upon by the examiner are:

| | | |
|------------------------------|-----------|--------------|
| Gallagher et al. (Gallagher) | 5,644,786 | July 1, 1997 |
| Wu et al. (Wu) | 5,931,912 | Aug. 3, 1999 |

Appellants' Admitted Prior Art (AAPA) page 2, lines 16-26 of the originally filed application.

THE REJECTIONS AT ISSUE

Claims 1, 2, 9 through 16, and 20 through 29 stand rejected under 35 U.S.C. § 103 as being obvious over Gallagher in view of Appellants' admitted prior art on page 2, lines 16-26 of the originally filed application. Claims 3 through 8, and 17 through 19 stand rejected under 35 U.S.C. § 103 as being obvious over Gallagher in view of Appellants' admitted prior art on page 2, lines 16-26 of the originally filed application and Wu. Throughout the opinion we make reference to the brief and the answer for the respective details thereof.

OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the examiner and the evidence of anticipation and obviousness relied upon by the examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, appellants' arguments set forth in the brief along with the examiner's rationale in support of the rejections and arguments in rebuttal set forth in the examiner's answer.

With full consideration being given to the subject matter on appeal, the examiner's rejections and the arguments of appellants and the examiner, for the reasons stated *infra* we will not sustain the examiner's rejection of claims 1 through 29 under 35 U.S.C. § 103.

Appellants assert, on page 6 of the brief:

Applicants' claimed invention focuses on a novel scheduling algorithm that has been referred to in the Application as a "fair elevator" algorithm. In doing so, both the requesters (e.g., the tasks, programs, users, etc. that may issue requests to a shared resource such as a DASD), as well as the positions on the DASD (e.g., as identified by track, sector, address, cylinder, etc.), that are associated with pending access requests, are used to sort those access requests for submission to the DASD.

Admittedly, sorting access requests to a DASD based upon requester, and sorting access requests to a DASD based upon DASD position, are individually known in the art.

Appellants argue, in the paragraph bridging pages 6 and 7 of the brief:

Where the examiner's rejection falls short of establishing a *prima facie* case of obviousness of claim 1, however, is in that the rejection fails to establish through objective evidence any suggestion or motivation in the prior art to modify the elevator algorithm disclosed in *Gallagher et al.* to address fairness concerns by additionally considering the identity of the requesters associated with the requests being sorted by the *Gallagher et al.* algorithm.

Further, on page 7 of the brief, appellants argue that, while Gallagher does teach that packets of requests may be sorted by priority, "priority of requests has nothing to do with the identity of the requestor associated with the request."

Additionally, appellants argue that if priority were analogized to identity of the requestor, Gallagher discloses sorting by location and then priority which is opposite the claimed invention which first sorted by requester and then location.

The examiner in response argues, on page 14 of the answer, that Gallagher provides motivation to modify the prior art teachings. The examiner states:

In this case, Gallagher provides such a motivation (Column 1, lines 26-32) when discussing the processing of requests, saying **"The order in which process requests are stacked and executed may vary from the order in which the requests are received by the scheduler in order to make efficient use of the I/O device or to provide preferential scheduling of higher priority requests."** (emphasis original)

While admitting that the two methods of sorting access requests are known in the art (page 6, paragraph 2, Appeal Brief), Appellant has argued that the motivation presented by Gallagher does not specifically address fairness concerns in the reference algorithm. However, this is not what is required. It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the AAPA [Appellants' Admitted Prior Art] taught well-known fairness algorithm that provides preferential scheduling of the oldest request by each requestor with the scheduling system of Gallagher in order to provide preferential scheduling of the highest priority requests.

Further, on page 15 of the answer, the examiner responds to the appellants' arguments directed to Gallagher's teaching of sorting based upon priority stating:

One of ordinary skill in the art would recognize that the well-known fair algorithm places a higher priority on the oldest request from each requestor. By moving a packet of the oldest single request from each requestor, and thereby prioritizing the oldest requests, into a queue to be sorted by position, a combined fair elevator algorithm is created.

We disagree with the examiner's reasoning. Claim 1 includes the limitation "sorting at least a subset of a plurality of access requests directed to the DASD based upon the requesters associated therewith to generate a first ordered set of access requests." Independent claims 9, 12, 13, 23 and 28

contain similar limitations that recite sorting access requests based upon requester. Appellants' specification, on page 1, provides a definition of requesters, stating: "[d]ifferent users and/or different tasks that require access to a DASD (collectively referred to herein as 'requesters')." Thus, we find that in the context of the claims requestors refers to the users or tasks that require access to the storage devices. We do not find that the term requestor either explicitly, or implicitly includes an indication of the age of the request. Further, we find that independent claims 1, 9, 12, 13, 23 and 28 all contain limitations that the access requests are sorted based upon positions associated with the requests.¹ Thus, we find that the scope of the claims includes sorting the requests by the users or tasks that made the requests, but we do not find a limitation directed to the age or latency of the requests and that the requests are sorted by positions associated with the requests.

We find that appellants' admitted prior art teaches a "fair algorithm" which schedules access requests in a round robin manner according to the identify of the requester. The goal of this fair algorithm is that it optimizes multitasking as all requesters get access and it reduces delays in accessing the shared memory, however it can result in longer seek times (i.e. the latency of requests is distributed among requests which optimizes access for all requests, however the time to process the individual request takes longer). We find that this "fair

¹ We note that only independent claims 1, 12 and 23 contain limitations directed to the order in which the sorting is performed

algorithm” meets the claimed sorting of access requests based upon requester. However, we do not find that this teaching “fair algorithm” teaches that the sorting should be combined with a sorting based upon position within the storage device.

We find that Gallagher teaches a system to schedule multiple requests to disk memory of a computer system. The system sorts the requests based upon the disk sector for the requested access, the requests are grouped into packets, which are sorted by packets. See column 3, lines 16-25, see also table 1 in columns 4 and 5. We find that Gallagher teaches that the packets can be scheduled based upon priority of the packet. See column 4, lines 44-52. However, we do not find that Gallagher equates priority to requester’s identity, and we do not find that requester’s identity should be a factor by which the requests or packets of requests should be sorted. We do not find that the statement, in column 1, lines 28-32 “The order in which process requests are stacked and executed may vary from the order in which the requests are received...” provides suggestion to modify Gallagher’s device to include a sort by requesters, as asserted by the examiner on page 14 of the answer. Rather, we find that the cited section of Gallagher simply identifies that the order of access determined by Gallagher’s system will be different than the order in which the requests were received by the requesters, a logical consequence if the sort to determine the order of access granted to the requests is based upon anything but the order of receipt of the requests. Thus, we find that neither

Gallagher or AAPA provides a suggestion to combine the references as cited by the examiner, to include a sort of requests based upon requester and based upon the position associated with the request. Accordingly, we will not sustain the examiner's rejection of claims 1, 2, 9 through 16, and 20 through 29 under 35 U.S.C. § 103 as being obvious over Gallagher in view of AAPA.

We next consider the examiner's rejection of claims 3 through 8 and 17 through 19 under 35 U.S.C. § 103 as being obvious over Gallagher in view of AAPA and Wu. Claims 3 through 8 and 17 through 19 all ultimately depend upon independent claims 1 or 13, and we find that the scope of the claims includes that the requests are sorted by the user or tasks that made the request and that the requests are sorted by positions associated with the requests. As stated *supra*, we do not find that the combination of Gallagher and AAPA teaches or suggests this limitation. The examiner has not asserted, nor do we find that, Wu teaches or suggests these limitations. Accordingly, we will not sustain the examiner's rejection of claims 3 through 8 and 17 through 19 under 35 U.S.C. § 103.

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